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Closure Sampling and Analysis Plan for Medical Training Facility

Westover Air Reserve Base
Massachusetts

Prepared For

Air Force Center for Environmental Excellence
Brooks Air Force Base

and

439th Support Group/ 439th Airlift Wing
Westover Air Reserve Base, Massachusetts

April 1997

PARSONS ENGINEERING SCIENCE, INC.

290 Elwood Davis Road, Suite 312 ● Liverpool, New York 13088 ● (315) 451-9560 FAX (315) 451-9570

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FINAL

CLOSURE SAMPLING AND ANALYSIS PLAN FOR MEDICAL TRAINING FACILITY WESTOVER AIR RESERVE BASE, MASSACHUSETTS

PREPARED FOR

AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE

BROOKS AFB, TEXAS

AND

439TH SUPPORT GROUP/439TH AIRLIFT WING
WESTOVER ARB, MASSACHUSETTS

PREPARED BY

PARSONS ENGINEERING SCIENCE, INC.
290 ELWOOD DAVIS RD., SUITE 312
LIVERPOOL, NEW YORK 13088

APRIL 1997

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SECTION 1
INTRODUCTION

This closure soil sampling and analysis plan (SAP) has been prepared for the US Air Force Center for Environmental Excellence (AFCEE) at Brooks Air Force Base (AFB), Texas; and Westover Air Reserve Base (ARB), Massachusetts. The SAP is intended to guide soil sampling at the Medical Training Facility (MTF) site at Westover ARB. The MTF site is the location of a release of heating oil from a former underground storage tank (UST).

In October 1994 during construction of a new Medical Training Facility, the Army Corps of Engineers uncovered an abandoned 2,000-gallon underground #2 fuel oil storage tank. The tank was removed on November 2, 1994, and petroleum hydrocarbon contaminated soil was encountered below the tank. This event prompted an Immediate Response Action (IRA), and the Massachusetts Department of Environmental Protection (DEP) assigned a Release Tracking Number (#1-10588) to the site.

As part of the Response Action, the MTF site was selected as a pilot test site for the AFCEE-sponsored Extended Bioventing Project. The Extended Bioventing Project is a follow-on contract to the AFCEE Bioventing Pilot Test Initiative project, which included more than 100 *in situ* bioventing pilot tests at 46 Air Force installations nationwide. These tests were designed to collect data on the effectiveness of bioventing for the remediation of vadose zone soils contaminated with fuel hydrocarbons (e.g., JP-4 jet fuel, diesel fuel, gasoline, and heating oil).

The 1-year bioventing pilot test at the MTF was completed in August 1996. The purpose of the pilot test was to evaluate the effectiveness of bioventing in remediating unsaturated soils contaminated with petroleum hydrocarbons thought to have resulted from heating oil released from the former UST. Based on the results of the extended bioventing test, *in situ* bioventing appears to have reduced petroleum hydrocarbon contamination in site soils sufficiently to meet Massachusetts Department of Environmental Protection (DEP) requirements for closure of the site.

This SAP presents a plan for confirmatory soil sampling to document the effectiveness of remediation of hydrocarbon-contaminated soils at the MTF site. The objective of the confirmatory soil sampling is to support a site closure recommendation for the soils contaminated by heating oil in the immediate vicinity of the former UST. The proposed closure sampling described in Section 4 is specific to the vadose zone soils targeted by the bioventing system in the vicinity of the former UST. Previous investigations have determined that groundwater has not been impacted by the release of petroleum hydrocarbons at the UST site. The closure soil sampling effort is being performed as part of the AFCEE Extended Bioventing project (Contract No. F41624-92-D-8036, Order 17).

This SAP consists of ten sections, including this introduction. Section 2 includes a site description, history, and summaries of previous investigations and remediation activities. Section 3 summarizes site closure requirements. A detailed SAP is presented in Section 4. Analytical results will be presented in a response action completion report as described in Section 5. Section 6 is a waste management plan for investigation-derived waste generated during drilling and sampling activities. Section 7 lists Westover ARB support requirements and Section 8 gives the proposed project schedule. Points of contact are provided in Section 9 and the references cited are provided in Section 10.

SECTION 2
SITE DESCRIPTION

2.1 Site Location And History

The Medical Training Facility (MTF), located in the central portion of the base between Niagara and Walker streets (Figure 2.1), was constructed in 1994 and 1995. During construction of the new facility, the Army Corps of Engineers uncovered an abandoned 2000-gallon underground #2 fuel oil storage tank within the new building foot print. The tank was removed on November 2, 1994 and petroleum hydrocarbon contaminated soil was encountered below the tank. The source of contamination is suspected to be a result of a historic spill. The locations of the MTF, the former UST, and the extent of petroleum hydrocarbon contaminated soil are shown on Figure 2.2.

2.2 Site Geology And Hydrology

Soils above the water table consist of fine sand with a trace of silt to a depth of at least 30 feet below ground surface (bgs). Fine to coarse sand with a trace of gravel exists beneath the fine sand layer to at least 42 feet bgs. Groundwater is encountered at a depth of approximately 40 feet bgs and generally flows in a westerly direction. A hydrogeologic cross-section of the MTF site is shown in Figure 2.3.

2.3 Previous Investigations

In October 1994 during construction of the new MTF, the Army Corps of Engineers uncovered an abandoned 2,000 gallon underground #2 fuel oil storage tank. In November 1994, the Corps proceeded to remove the tank and some contaminated soil surrounding the tank. Environmental Compliance Services, Inc. (ECS) was contracted to conduct Immediate Response Actions (IRA) including performing a soil gas survey at 12 locations near the construction site, collecting three groundwater samples from temporary monitoring wells upgradient and downgradient of the former underground storage tank (UST), and performing a ground penetrating radar (GPR) survey in the area of the former UST to identify the possible presence of additional USTs in the area.

The ECS assessment activities revealed no evidence of groundwater contamination near the former UST area, and no evidence of soil gas contamination or additional USTs in the area outside of the former UST area (ECS, 1994).

In December 1994, Tighe and Bond, Inc. advanced four soil borings to the groundwater table within the new building footprint in order to further delineate the extent of contamination. These soil borings locations are shown on Figure 2.2. Soil samples were collected from each boring and analyzed for total petroleum hydrocarbons (TPH). Two soil samples, collected from soil borings B-1 and B-3 from between 15 and 25 feet below ground surface, contained TPH concentrations above 10,000 mg/kg, which exceeded the Massachusetts Department of Environmental Protection (DEP) risk-based

soil clean-up goal of 5,000 ppm (310 CMR 40.0975). Table 2.1 summarizes the analytical results for petroleum constituents in subsurface soil and compares them to the Massachusetts DEP clean-up goals. Figure 2.2 shows the distribution of detected TPH compounds prior to site remediation.

In April 1995, a pilot scale bioventing system was installed in the MTF area by Parsons Engineering Science, Inc. (Parsons ES) as part of the Air Force Center for Environmental Excellence (AFCEE) Extended Bioventing Project (Contract No. F41624-92-R-8036, Order 17). As shown in Figure 2.2, the installed bioventing system consisted of a single vent well (VW), three multi-depth vapor monitoring points (MPs), and a blower unit. During installation, respiration and air permeability testing and soil and soil gas sampling were performed. A detailed description of bioventing system design and initial site activities are provided in the July 1995 Bioventing Interim Test Results report prepared by Parsons ES for this site. The project at the MTF included 1 year of system operation followed by soil gas sampling and respiration testing.

Soil gas samples were collected and *in situ* respiration testing was performed in July and August 1996, following 1 year of system operation. Analytical results from the soil gas sampling and respiration testing indicated that significant reductions in TPH and BTEX compounds had taken place with the estimated 30- to 40-foot radius of the vent well (VW). The system was shut down 30 days prior to testing to allow soils and soil gas to come to equilibrium in order to compare 1-year and initial conditions. Table 2.2 summarizes the results of the soil gas sampling and Table 2.3 summarizes initial and 1-year respiration and fuel biodegradation rates at the site.

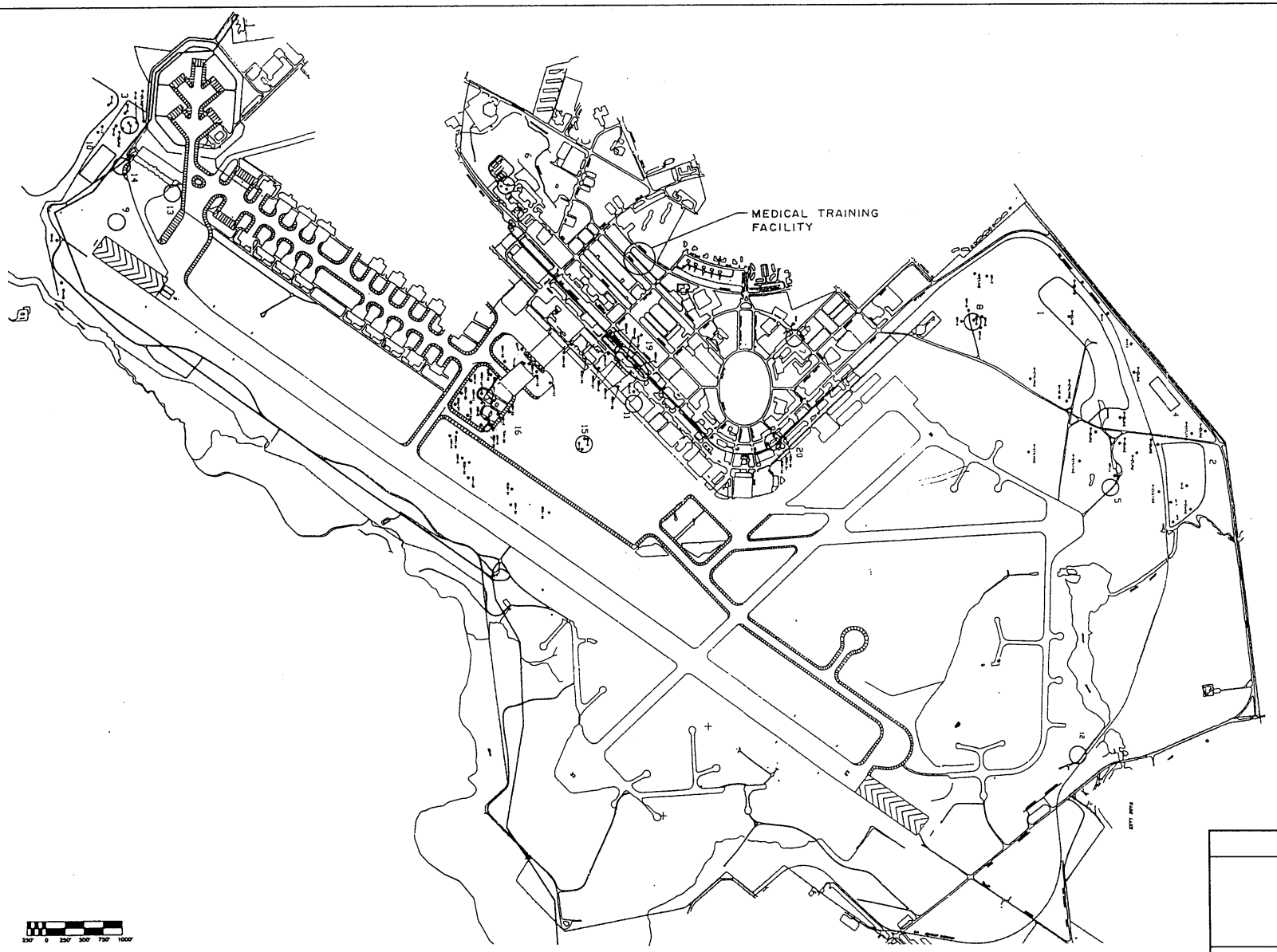

FIGURE 2.1

WESTOVER AIR RESERVE BASE
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SITE LOCATION MAP

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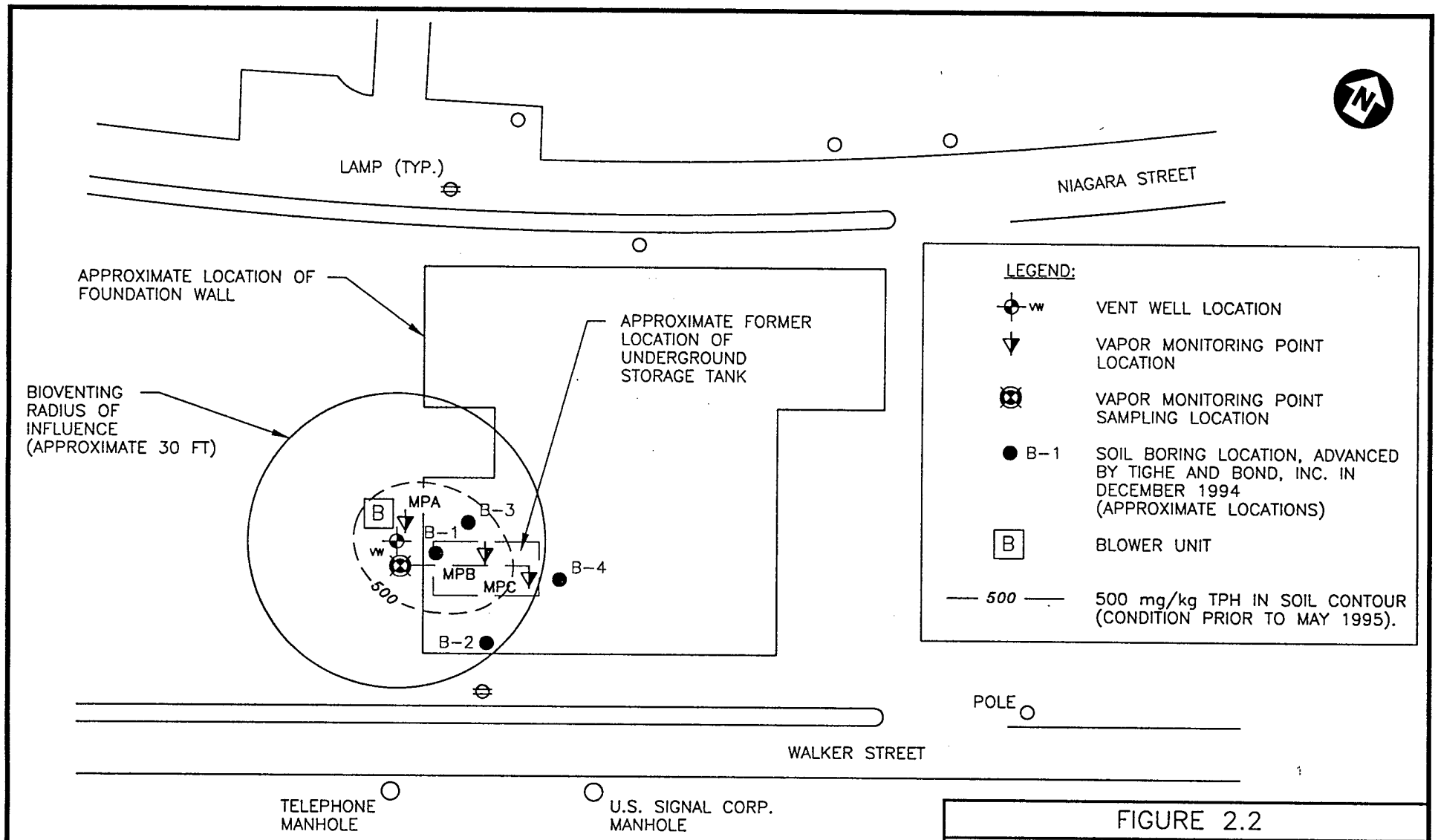

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FIGURE 2.2

WESTOVER AIR RESERVE BASE
MASSACHUSETTS

AS-BUILT BIOVENTING SYSTEM LOCATION
MEDICAL TRAINING FACILITY

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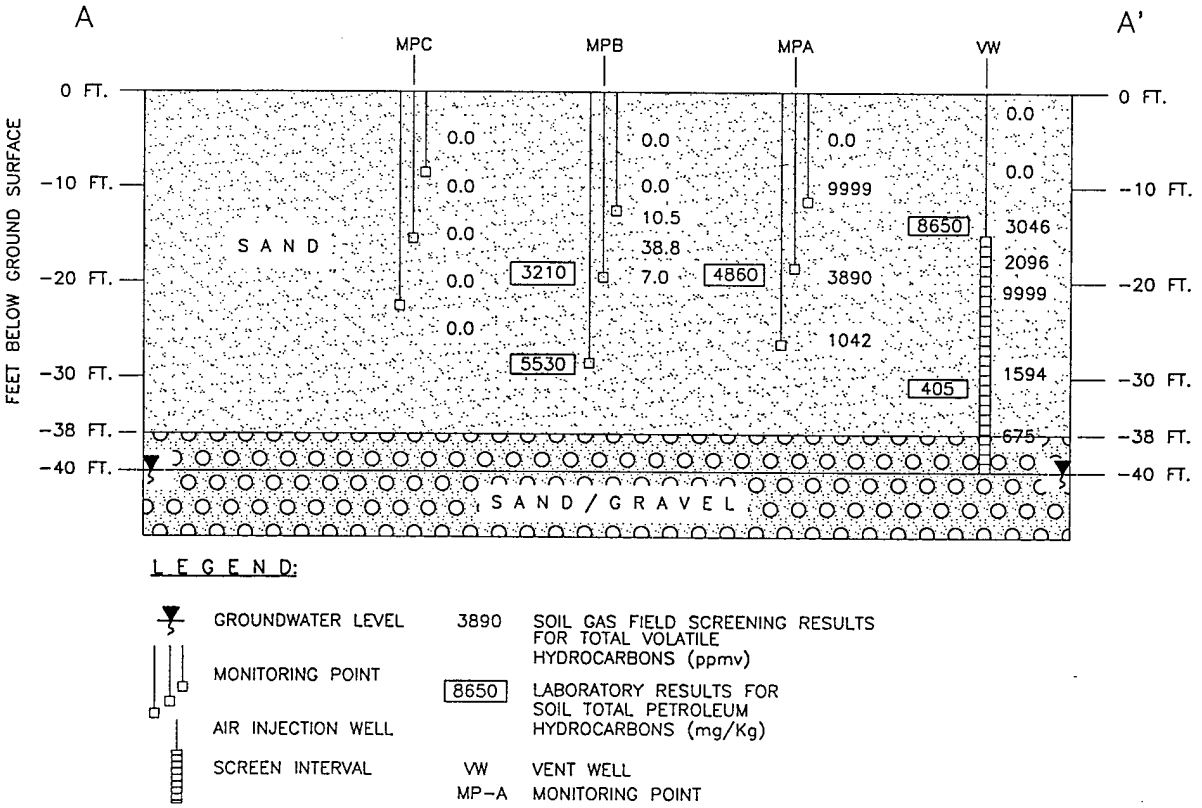

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HORIZONTAL SCALE

20' 10' 0 20'

Approximate Scale in Feet

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FIGURE 2.3

WESTOVER AIR RESERVE BASE
MASSACHUSETTS

GEOLOGIC PROFILE
MEDICAL TRAINING FACILITY

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Table 2.1
Soil Analytical Results Compared to Massachusetts DEP Criteria
Medical Training Facility Site
Westover Air Reserve Base, Massachusetts

	Analyte[a]				
	TPH (mg/kg)[b]	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
Massachusetts DEP Criteria					
Class A-2 Standard[c]	500	10	90	80	500
Class A-3 Standard[d]	5,000	10	90	80	500
Sample Location[e]					
Parsons ES[f]					
VW-14-16	8650[j]	0.052U[g]	0.052U	0.089	1.1
VW-30-32	405	0.053U	0.053U	0.053U	0.13U
MPA-20-22	4,860	0.053U	0.053U	0.053U	0.39
MPB-20-22	3,210	0.057U	0.057U	0.057U	0.14U
MPB-26-28	5,530	0.068U	0.21	0.068U	1.5
TBI[h]					
B-1 (15-17)	18,000	---[i]	---	---	---
B-2 (40-42)	55	---	---	---	---
B-3 (20-22)	14,000	---	---	---	---
B-4 (40-42)	54	---	---	---	---

[a] TPH=total petroleum hydrocarbons analyzed by EPA Method 418.1; BTEX analyzed by EPA Method SW8020.

[b] mg/kg=milligrams per kilogram.

[c] Class A-2 - Closure with no activity and use limitation (AUL), based on S-1 values.

[d] Class A-3 - Closure with implementation of an AUL deed restriction, based on S-3 values.

[e] Sample location gives location of boring and sample depth in feet below ground surface.

[f] Soil samples collected in April, 1995, by Parsons ES, prior to bioventing system startup.

[g] U=compound analyzed for, but not detected. Number shown represents the method detection limit.

[h] Soil samples collected on December, 1994, by Tighe and Bond, Inc.

[i] ---=not analyzed.

[j] Shading indicates detection above Class A-3 standards.

Table 2.2
Initial and 1-Year Soil Gas Field and Laboratory Analytical Results
Medical Training Facility
Westover Air Reserve Base, Massachusetts

Sample Location[a/]	Sampling Event[b/]	Field Screening Data			Analytical Data				
		Oxygen (percent)	Carbon Dioxide (percent)	Field TVH[c/] (ppmv)[d/]	Laboratory TVH (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Xylenes (ppmv)
VW	Initial	19.5	1	78	150	0.1	1.1	0.32	2.7
	1-Year	---	---	---	---[e/]	---	---	---	---
MPA-11-13	Initial	19.8	1.1	110	260	0.009	0.56	0.74	4.7
	1-Year	19.1	0.6	500	8.8	0.006	0.017	0.015	0.11
MPA-26-28	Initial	19.1	1.5	94	330	0.011U	0.011U	1	5.8
	1-Year	7.0	8.5	1100	45	0.002	0.006	0.014	0.2
MPB-12-14	Initial	19.8	0.8	42	48	0.005	0.15	0.054	0.25
	1-Year	20.0	0.2	100	9.9	0.002U	0.006	0.003	0.027
MPB-19-21	Initial	19.5	1.0	63	240	0.01U	0.26	0.21	0.84
	1-Year	19.9	0.3	600	8.7	0.002	0.004	0.003	0.022
MPB-26-28	Initial	18.9	1.5	150	430	0.0018U	0.0018U	0.53	3.6
	1-Year	20.0	0.0	80	---	---	---	---	---
MPC-8-10	Initial	20.0	0.5	34	---	---	---	---	---
	1-Year	19.2	0.7	300	---	---	---	---	---
MPC-15-17	Initial	20.0	0.5	63	---	---	---	---	---
	1-Year	---[g/]	---	---	---	---	---	---	---
MPC-22-24	Initial	20.0	0.5	32	---	---	---	---	---
	1-Year	20.2	0.0	70	---	---	---	---	---

[a/] Sample location identifies the monitoring point and depth in feet below ground surface.

[b/] Initial soil gas sampling was performed on 5 June 1995. 1-Year soil gas sampling was performed on 29 July 1996.

[c/] TVH=total volatile hydrocarbons.

[d/] ppmv=parts per million, volume per volume.

[e/] ---=not analyzed.

[f/] U=compound analyzed for , but not detected. Number shown represents the method detection limit.

[g/] ---=not analyzed due to flooded monitoring point screen.

Table 2.3
Medical Training Facility
Respiration and Degradation Rates
Westover Air Reserve Base, Massachusetts

Location-Depth (feet below ground surface)	Initial[a/]		1-Year[b/]	
	K_o (% O_2/min)	Degradation Rate (mg/kg/year)[c/]	K_o (% O_2/min)	Degradation Rate (mg/kg/year)[c,d/]
MPA-11-13	0.00024	71	0.00026	76
MPA-26-28	0.00021	62	0.0028	671
MPB-26-28	0.00028	43	0.000048	7

[a/] Initial respiration testing was performed in June 1995.
[b/] 1-Year respiration testing was performed in July and August 1996.
[c/] Milligrams of hydrocarbons per kilogram of soil per year.
[d/] Assumes moisture content of the soil following 1 year is the same as initial moistures.

SECTION 3
SITE CLEANUP REQUIREMENTS

The objective of the closure soil sampling is to support a Response Action Outcome Statement recommendation for the soil contaminated by fuel oil near the MTF at Westover ARB, Massachusetts. This sampling plan targets only unsaturated soils above the groundwater table. Groundwater has not been significantly impacted as described in Section 2.

Cleanup standards are based on the Massachusetts DEP's Risk Characterization Method 1 of the Massachusetts Contingency Plan. Based on the known site conditions, site soils at the MTF site would likely be classified as either a Class A-2 or a Class A-3 Response Action Outcome (RAO). Class A RAOs refer to permanent response actions which eliminates or controls a source of oil and/or hazardous material. Definitions of the three Class A RAOs are summarized below.

Class A-1 applies to sites where:

- a permanent solution has been achieved and the level of oil and hazardous material has been reduced to background; or

- sites where response actions have eliminated all threats of release and no release of oil and/or hazardous material to the environment has occurred.

Class A-2 applies to sites where:

- a permanent solution has been achieved and the level of oil and hazardous material has not been reduced to background; and

- one or more Activity and Use Limitations are not required to maintain a level of No Significant Risk.

Class A-3 applies to sites where:

- a permanent solution has been achieved and the level of oil and hazardous material in the environment has not been reduced to background; and

- one or more Activity and Use Limitations have been implemented to maintain a level of no significant risk.

In accordance with the Massachusetts Contingency plan, soil must be categorized as either category S-1, S-2 or S-3. The soil categories are based on the potential for exposure. Category S-1 is associated with the highest potential for exposure and Category S-3 is associated with the lowest potential for exposure. Sites which meet applicable S-2 or S-3, but not S-1 soil standards must implement an Activity and Use

Limitation to ensure that the soil category does not change without further assessment/remediation. Definitions of the soil categories are described below:

Category S-1 applies to sites where:

- impacted soil is accessible (less than 3 feet below the ground surface)
- children are present with high frequency or low frequency but high intensity or where adults are present at a high frequency and high intensity.

Category S-2 applies to sites where:

- impacted soil is potentially accessible (between 3 and 15 feet unpaved, or 0 to 15 feet paved)
- children are present with high frequency and low intensity, low frequency and high intensity or where adults are present at a high frequency and high intensity.

Category S-3 applies to sites where:

- impacted soil is isolated (greater than 15 feet below ground surface or under the footprint of a building or permanent structure).

Assuming a Class A-3 RAO (Category S-3 soil classification) for impacted soils at the MTF, soils should be remediated to concentrations of less than 5,000 mg/kg total petroleum hydrocarbons (TPH), 10 mg/kg benzene, 90 mg/kg toluene, 80 mg/kg ethylbenzene, and 500 mg/kg xylenes. Assuming a Class A-2 RAO (Category S-1 soil classification), soils should be remediated to concentrations of less than 500 mg/kg TPH and must meet Class A-3 RAO benzene, toluene, ethylbenzene, and xylene concentrations. A compound by compound list of cleanup goals for both a Class A-2 and a Class A-3 RAO is shown on Table 3.1. The Class RAO (e.g. Class A-2 or Class A-3) at the MTF will depend on the results of the soil sampling.

A licensed site professional (LSP), Mr. Robert Kane (LSP # 4333) of the Parsons ES office in Boston, Massachusetts has become the new LSP of record on this project. Mr. Kane will advise the project team on regulatory issues pertaining to site closure, will review all pertinent site documents, and will ensure that the following site closure requirements are met, prior to recommending site closure to the Massachusetts DEP.

Table 3.1
Massachusetts Contingency Plan
Soil Cleanup Goals
Medical Training Facility Site
Westover Air Reserve Base, Massachusetts

Analyte[a]	Class A-2 RA0 Cleanup Goals (mg/kg)[b]	Class A-3 RA0 Cleanup Goals (mg/kg)[c]
USEPA Method 418.1		
Total Recoverable Petroleum Hydrocarbons	500	5000
USEPA Method 8020A		
Volatile Organics		
Benzene	10	10
Chlorobenzene	8	8
1,2-Dichlorobenzene	100	200
1,3-Dichlorobenzene	100	200
1,4-Dichlorobenzene	2	2
Ethylbenzene	80	80
Toluene	90	90
Xylenes (total)	500	500
USEPA Method 8310		
Polyaromatic Hydrocarbons		
Acenaphthene	20	20
Acenaphthylene	100	100
Anthracene	1000	1000
Benzo (a) anthracene	0.7	4
Benzo (b) fluoranthene	0.7	4
Benzo (k) fluoranthene	7	40
Benzo (ghi) perylene	100	100
Benzo (a) pyrene	0.7	0.7
Chrysene	7	40
Dibenzo (a,h) anthracene	0.7	0.8
Fluroanthene	600	600
Fluorene	400	400
Indeno (1,2,3-cd) pyrene	0.7	4
Naphthalene	4	4
Phenanthrene	700	700
Pyrene	500	500

a\ VPH/EPH RAO cleanup goals are not available.

b\ Class A-2 RAO cleanup goals are based on soil category S-1 and groundwater category GW-1 standards.

c\ Class A-3 RAO cleanup goals are based on soil category S-3 and groundwater category GW-1 standards.

SECTION 4
SAMPLING AND ANALYSIS PLAN

The following SAP describes the sampling locations and depths, soil sampling procedures, and analytical methods that will be used to collect sufficient data to verify remediation of MTF site soils and to support site closure.

As described in Section 2, results from the limited soil and soil gas sampling conducted following approximately 12 months of bioventing indicated significant reductions in soil BTEX and TPH concentrations attributed to bioventing remediation. Prior to bioventing, soil petroleum hydrocarbon contamination was limited to an area of approximately 25 feet wide, 40 feet long and approximately 15 to 30 feet deep near the former UST location. Therefore, Parsons ES will install and sample 3 vertical and 3 angle boreholes in the vicinity of the former UST. Vertical borings will be installed along the outside of the building foundation and within the documented area of soil contamination. Angle borings will be installed to collect soil samples from beneath the building and within the former UST excavation. The soil samples collected from beneath the building, along with the samples collected from outside of the building foundation, will allow a more complete characterization of the possible petroleum hydrocarbon contamination remaining in the soils.

4.1 Drilling, Sampling, And Equipment Decontamination

Three vertical and three angled boreholes will be drilled and sampled in the vicinity of the former UST at the approximate locations shown on Figure 4.1. Boreholes will be advanced using a drill rig equipped with the capability of drilling in the vertical position and at an angle to the ground surface. Vertical boreholes will be drilled to the groundwater table at approximately 40 feet below the ground surface. Angled boreholes will be drilled at approximately a 45 degree angle, beginning 15 feet away from the building foundation. These boreholes will be completed to 30 feet below the ground surface, and 15 feet within the building foundation. All drilling will be performed using 4.25-inch inside-diameter (ID) hollow-stem augers. Each borehole will be logged by a Parsons ES geologist.

Soil samples will be collected at 2 to 4 foot intervals from 15 feet bgs to the bottom of each boring. Samples will be screened with a photoionization detector (PID) or a total volatile hydrocarbon analyzer (TVHA). Soil samples exhibiting staining, odor, or headspace readings above background will be sent to a laboratory for analysis. A maximum of two samples from each borehole will be analyzed. If none of the soil samples collected from the boring exhibit evidence of contamination, then one soil sample will be analyzed from the 15 to 17 foot bgs interval and one will be analyzed from the deepest soil sample collected from that boring. In addition, one background sample will be colected in an area southeast of the MTF site. This sample will be collected at a depth interval of 2 to 4 feet using a hand auger.

The downhole equipment will be cleaned before use and between boreholes to prevent cross-contamination. Cleaning will be accomplished using a high pressure hot water wash, followed by a potable water rinse. Decontamination fluids will be collected and contained in labeled 55-gallon drums. Drill cuttings will also be contained in labeled 55-gallon drums. However, to minimize cutting disposal costs, soil showing no field evidence of contamination will be returned to the borehole from which they were generated.

4.2 Analytical Methods

The soil sampling analytical methods and detection limits are presented in Table 4.1. All samples will be sent to Inchcape Testing Services in Richardson, Texas. Soil samples will be analyzed for TPH by USEPA Method 418.1, BTEX by USEPA Method SW8020A, and polyaromatic hydrocarbons (PAHs) by USEPA Method SW8310. In addition, the three angled boring samples and two of the vertical boring samples will also be analyzed for volatile petroleum hydrocarbons (VPH) and extractable petroleum hydrocarbons (EPH) by USEPA Method SW8015 Modified. The background sample will be analyzed for TPH, VPH and EPH. Quality control (QC) samples will be collected and analyzed to assess field and laboratory methods. QC samples to be analyzed include a minimum of one trip blank, one matrix spike/matrix spike duplicate, and one field duplicate.

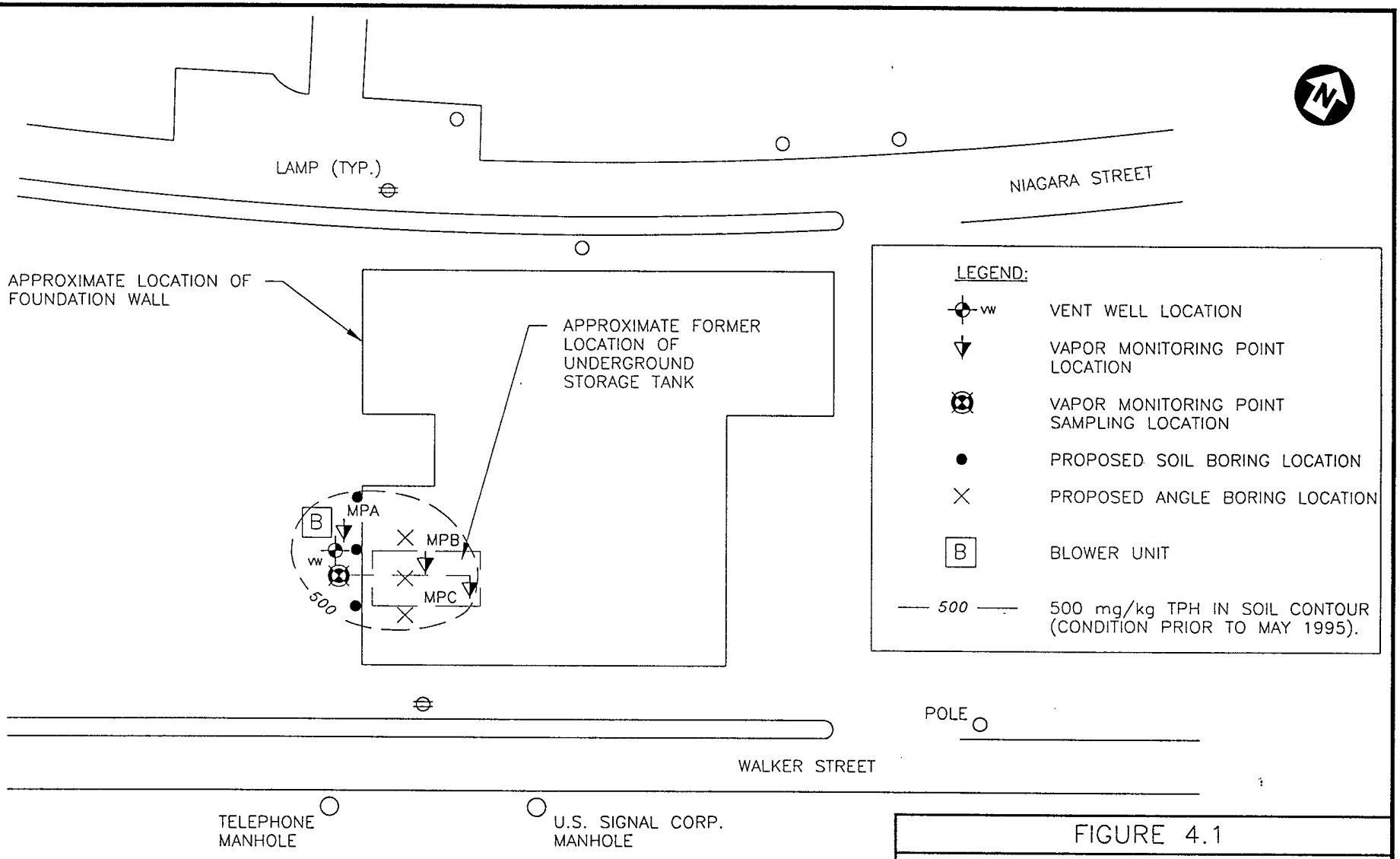

FIGURE 4.1

WESTOVER AIR RESERVE BASE
MASSACHUSETTS

PROPOSED CONFIRMATORY
SOIL SAMPLING LOCATIONS
MEDICAL TRAINING FACILITY

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Table 4.1
Proposed Soil Sample Analytical Methods,
Practical Quantitation Limits, and Number of Samples
Medical Training Facility Site
Westover Air Reserve Base, Massachusetts

Analyte	Number of Samples[a]	Detection Limit (ug/kg)
USEPA Method 418.1		
Total Recoverable Petroleum Hydrocarbons	12	10
USEPA Method 8015 (Modified)		
Volatile Petroleum Hydrocarbons (VPH)	5	10
Extractable Petroleum Hydrocarbons (EPH)	5	10
USEPA Method 8020A		
Volatile Organics		
Benzene	12	1
Chlorobenzene	12	2
1,2-Dichlorobenzene	12	4
1,3-Dichlorobenzene	12	4
1,4-Dichlorobenzene	12	3
Ethylbenzene	12	2
Toluene	12	2
Xylenes (total)	12	2
USEPA Method 8310		
Polyaromatic Hydrocarbons		
Acenaphthene	12	1.2
Acenaphthylene	12	1.54
Anthracene	12	0.44
Benzo (a) anthracene	12	0.009
Benzo (b) fluoranthene	12	0.012
Benzo (k) fluoranthene	12	0.05
Benzo (ghi) perylene	12	0.011
Benzo (a) pyrene	12	0.015
Chrysene	12	0.1
Dibenz (a,h) anthracene	12	0.02
Fluroanthene	12	0.14
Fluorene	12	0.14
Indeno (1,2,3-cd) pyrene	12	0.03
Naphthalene	12	1.2
Phenanthrene	12	0.42
Pyrene	12	0.18

[a] Excludes QC samples. Number of samples indicate maximum number of samples analyzed assuming two samples are analyzed per boring.

SECTION 5
RESPONSE ACTION COMPLETION REPORT

Following receipt of the laboratory analytical results, a Draft Response Action Completion Report and a Response Action Outcome Statement will be prepared by a licensed site professional (LSP) and submitted to Westover ARB and AFCEE.

The report will contain the following information for the MTF site:

- Results of previous soil and groundwater sampling results, including the reasoning for not resampling/further assessing the groundwater at the site;
- Plot plans showing final borehole locations;
- A site map documenting the portion of the disposal site for which the RAO applies. The map will include dimensions from buildings, depth, and other benchmarks or surveyed property lines to sufficiently define the RAO area;
- Summary of field activities;
- Assessment of analytical results in comparison to Massachusetts DEP's Risk Characterization Method 1 soil cleanup criteria for TPH and BTEX;
- Laboratory analytical reports and chain-of-custody forms;
- Borehole logs;
- Conclusions and recommendations for site closure or additional cleanup action; and
- A description of any operation, maintenance, and/or monitoring that will be required to confirm and/or maintain conditioning at the site.

Comments received from Westover ARB and AFCEE will be incorporated into a draft final report to be distributed to Massachusetts DEP, AFCEE and Westover ARB. Any comments received from the Massachusetts DEP on the draft final version will be incorporated into a final report.

SECTION 6
WASTE MANAGEMENT PLAN

This waste management plan applies to the activities that will be performed for confirmation soil sampling at Westover ARB's Medical Training Facility. The plan describes the types of investigation derived waste (IDW) that will be generated and management of the generated waste, including inventory, tracking, reporting, and disposal.

6.1 Waste Types

The waste materials that may be generated during the confirmation sampling and managed under this plan include both solid materials and waste waters. The solid materials include cuttings produced from drilling soil boreholes, disposable sampling equipment, and personal protective equipment (PPE). The waste waters that may be produced include rinseate water from decontamination of drilling and sampling equipment. The following paragraphs describe the management procedure for these materials.

6.2 Waste Management

6.2.1 Drill Cuttings

Soil drill cuttings, as an environmental media, are not considered as solid waste. They can, however, contain listed hazardous wastes or enough hazardous constituents that they may exhibit hazardous waste characteristics. The general approach is to manage soil cuttings in a conservative manner by containerizing them, unless there is information available to predetermine that the soil is clean. The following paragraphs describe the management of drill cuttings from soil boreholes.

The soil borehole sampling locations were selected to confirm adequate remediation of soils previously identified as being contaminated with fuel related hydrocarbons. As such, drill cuttings from site boreholes that show evidence of petroleum contamination (i.e. staining, odor, or PID reading) will be containerized into 55-gallon drums (DOT 17-H) as the standard procedure. Drill cuttings that do not show evidence of petroleum contamination will be returned to the bore hole from which they were generated. The typical borehole total depth is expected to be approximately 40 feet bgs. Soil cuttings will be field screened while drilling using a PID. Samples for laboratory analysis will be selected based on field screening results. Containerized soil cuttings from boreholes will be left at the drill site until the laboratory analytical data is available. If the soil does not contain any hazardous constituents at concentrations exceeding risk-based soil criteria for Westover ARB's MTF, then the soil cuttings will be spread on the ground surface near the boreholes.

If the analytical results indicate contaminant levels exceed the risk-based soil criteria, the containerized drill cuttings will be properly labeled, transported to a waste storage

area, and managed appropriately. The costs associated with waste disposal is the responsibility of Parsons ES. If the risk-based soil criteria are exceeded, it is expected that containerized soil from the site will be classified as Petroleum Contaminated Soil and will be disposed of at a landfill licensed to accept these wastes. Based on analytical results, drill cuttings which either contain a listed hazardous waste or sufficient hazardous constituents that they exhibit hazardous waste characteristics will be disposed of at a licensed treatment, storage, disposal, and recycling (TSDR) facility.

6.2.2 Personal Protective and Disposable Sampling Equipment

Confirmation soil sampling equipment and clothing which becomes contaminated, and will not be reused, will be containerized for offsite disposal. Examples of PPE include latex gloves and Tyvek® suits. Sample bottles and plastic sheeting are examples of disposable sampling equipment. These materials represent solid waste and will be considered hazardous waste if they are suspected to be contaminated with listed wastes. These materials will be containerized and managed in accordance with Massachusetts policies for IDW.

6.2.3 Decontamination/Equipment Rinseate Water

Water generated during decontamination of drill rigs will be collected, placed into storage drums and labeled appropriately. These materials will be managed in accordance with Massachusetts policies for IDW.

6.3 Waste Inventory, Tracking, And Reporting

All solid materials generated from confirmation soil sampling activities and classified as containing hazardous or petroleum contaminated waste, will be managed using "cradle-to-grave" tracking procedures. Formal documentation of the waste stream will commence when a container is placed into service. A container is placed into service when it is assigned an accumulation start date, a unique identification number, and a waste tracking inventory sheet. The waste tracking inventory sheet is initiated when a container is placed into service. Entries are made on the waste tracking inventory sheet in the information section as waste is added to the container, or if the container is moved to a new location. This information allows the identification of all containers in service and the number of days left on each container's 90-day clock. The inventory sheet is completed and the unique identification number is closed when the waste is treated, consolidated, or shipped to a commercial TSDR, or other licensed waste disposal facility, depending on the waste classification.

Establishment of a waste stream profile sheet requires preparation of a commercial TSDR facility, or other licensed waste disposal facility, profile information sheet. The characterization information that must be entered on the form is required by the disposal facility to profile and accept the waste. When a shipment is made, a Uniform Hazardous Waste Manifest or appropriate State manifest is prepared and accompanies each shipment to the disposal facility. This record includes the generator copy of the manifest which is replaced by the original copy upon return, including the commercial disposal facility representative's signature. Manifest information is added to the waste tracking inventory sheet. Disposal of all waste will be coordinated and funded by Parsons ES. However, it will be the responsibility of Westover ARB to sign the manifest and any other appropriate forms.

SECTION 7
BASE SUPPORT REQUIREMENTS

The following Westover ARB support is needed prior to the arrival of the drillers and the Parsons ES team:

- Assistance in obtaining drilling and digging permits.
- Arrangement of site access for Parsons ES and the drilling subcontractor.
- Provision of an acceptable area for equipment decontamination.
- Provision of a potable water supply for decontamination activities.
- Assistance in disposing waste materials.

SECTION 8
PROJECT SCHEDULE

The following schedule is contingent upon approval of this closure sampling and analysis plan and completion of Westover ARB's support requirements.

EVENT	DATE
Submit draft closure SAP to AFCEE and Westover ARB	10 January 1997
Receipt of AFCEE and Westover ARB comments	14 February 1997
Submit draft final SAP to AFCEE, Westover ARB, and Massachusetts DEP	28 February 1997
Receipt of Massachusetts DEP comments	28 March 1997
Submit final SAP to AFCEE, Westover ARB, and Massachusetts DEP	11 April 1997
Begin confirmatory soil sampling	5 May 1997
Submit draft confirmatory soil sampling report to AFCEE and Westover ARB	27 June 1997
Receipt of AFCEE and Westover ARB's comments	11 July 1997
Submit final confirmatory soil sampling and Response Action Outcome report to AFCEE Westover ARB and Massachusetts DEP	25 July 1997

SECTION 9
POINTS OF CONTACT

Mr. Jack Moriarty/Paul Kwiatkowski
Base Civil Engineering
250 Patriot Ave., Suite 1
Westover ARB, Massachusetts 01022-1670
(413) 557-2434/2541

Cpt. Ed Marchand
AFCEE/ERT
3207 North Road, Bldg. 532
Brooks ARB, Texas 78235-5363
(210) 536-4364
(210) 536-4330 (fax)

Mr. John Mastracchio
Parsons Engineering Science, Inc.
290 Elwood Davis Rd., Suite 312
Liverpool, New York 13088
(315) 451-9560
(315) 451-9570 (fax)

Mr. John Ratz
Parsons Engineering Science, Inc.
1700 Broadway, Suite 900
Denver, Colorado 80290
(303) 831-8100
(303) 831-8208 (fax)

Mr. Robert Kane (LSP # 4333)
Licensed Site Professional
Parsons Engineering Science, Inc.
101 Huntington Avenue
Boston, Massachusetts 02199
(617) 859-2000

SECTION 10
REFERENCES

Environmental Compliance Services, Inc. 1994. Immediate Response Action Plan, Medical Training Facility, Westover ARB, Chicopee, Massachusetts. Prepared for Mr. Hank Lemanski, Operational Contacting Office, Westover ARB. Agawan, Massachusetts. November.

Massachusetts Department of Environmental Protection. 1995. Guidance for Disposal Site Risk Characterization, In Support of the Massachusetts Contingency Plan. Bureau of Waste Site Cleanup and Office of Research and Standards. July.

Massachusetts Contingency Plan. 310 CMR 40.

Parsons Engineering Science, Inc. 1995. Draft Final Bioventing Test Work Plan for Medical Training Facility Site, Westover Air Reserve Base, Massachusetts. Prepared for Air Force Center for Environmental Excellence. Liverpool, New York. May.

Parsons Engineering Science, Inc. 1995. Draft Bioventing Interim Test Results For Medical Training Facility, Westover ARB, Massachusetts. Prepared for Air Force Center for Environmental Excellence. Liverpool, New York. July.

Parsons Engineering Science, Inc. 1996. Letter regarding Extended Bioventing Testing Results at the Medical Training Facility, Westover ARB. Liverpool, New York. September.

Tighe E. Bond. 1995. Letter regarding Soil Borings at Medical Training Facility, Westover ARB. Chicopee, Massachusetts. January.

APPENDIX

RESPONSE TO COMMENTS ON DRAFT AND DRAFT FINAL CLOSURE SAMPLING AND ANALYSIS PLAN

RESPONSE TO AFCEE, WESTOVER ARB AND MASSACHUSETTS DEP COMMENTS TO THE DRAFT FINAL CLOSURE SAP FOR THE MEDICAL TRAINING FACILITY SITE, WESTOVER ARB, MASSACHUSETTS

These responses have been prepared to address AFCEE, Westover Air Reserve Base (ARB) and Massachusetts Department of Environmental Protection (DEP) comments made to the Draft Final Closure Sampling and Analysis Plan (SAP) for the Medical Training Facility site at Westover ARB, Massachusetts. Each AFCEE, Westover ARB and Massachusetts DEP comment is shown below in italics with the corresponding response below each comment.

AFCEE Comments:

Please place the written comments and responses in the Appendix of the Final Closure SAP.

Done.

Westover ARB Comments:

1. *Cover & Cover Page: The report has been prepared for AFCEE and for 439th Support Group/439th Airlift Wing, not the 439th Civil Engineering Squadron.*

   The cover and cover page have been revised.

2. *Page 3-2: Information on Robert Kane, LSP, should include his License Number.*

   Robert Kane's LSP License Number has been added to pages 3-2 and 9-1.

Massachusetts DEP Comments:

1. *As proposed in this report, depending on the sampling results this site may be eligible for a Class A-2 or A-3 RAO statement. If an AUL is deemed necessary (Class A-3) for this site, it (the AUL) must be in place prior to the submittal of the RAO. It should also be noted that an AUL is not necessary at disposal sites where residual contamination is located at a depth greater than 15 feet from the ground surface (310 CMR 40.1012 (3)(b)).*

   No comment necessary.

2. *Parsons should document on a site map the portion of the disposal site for which the RAO applies, pursuant to 310 CMR 40.1003 (4). The map should show dimensions from buildings, depth, other benchmarks or surveyed property lines. A person should be able to go to the site in the future and be able to accurately find the RAO area.*

   In response to this comment, a bullet item has been added to Section 5 - Response Action Completion Report stating that "a site map documenting the portion of the

disposal site for which the RAO applies (will be included) . . . This map will include dimensions from buildings, depth, and other benchmarks or surveyed property lines to sufficiently define the RAO area."

3. *Previous groundwater results should be documented in the RAO statement. Also, all reasoning for not resampling/further assessing (i.e. why Parsons states that the groundwater was not "significantly impacted") the groundwater at the site should be stated in the RAO statement.*

   A discussion will be included in the RAO and the Response Action Completion Report describing the reasoning for not resampling/further assessing the groundwater at the MTF site.

4. *When a Permanent Solution has been implemented at a disposal site, a Class A RAO applies to the site (310 CMR 40.1035). The implementation of a permanent solution must be accompanied by an evaluation of the feasibility of reducing OHM levels to background. For a class A-2 or A-3 you must demonstrate that the achievement of background is not feasible (310 CMR 40.1056 (2)(e)). Either site specific background samples or MADEP published background levels should be obtained or used.*

   The collection of a background sample has been added to the sampling and analysis plan in Section 4. One background sample will be collected from an area southeast of the MTF site. This sample will be collected at a depth interval of 2 to 4 feet using a hand auger. The sample will be analyzed for TPH by USEPA Method 418.1, volatile petroleum hydrocarbons (VPH) and extractable petroleum hydrocarbons (EPH) by USEPA Method SW8015 Modified. MADEP published background levels will be used for comparison with benzene, toluene, ethylbenzene and xylene (BTEX) and polyaromatic hydrocarbons present at the site.

5. *Relative information on using the new EPH/VPH Method 1 Standards can be found by calling the MCP Helpline (617) 338-2255 or by accessing DEP on the World Wide Web: http://www.magnet.state.a.us/dep. Related papers on EPH/VPH:*
   May 1996: "Issues Paper: Implementation of VPH/EPH Approach"
   Nov. 1, 1996: Proposed Changes to the MCP Numerical Standards
   Jan. 15, 1997: Letter from Jim Colman to LSPs and Interested Parties. (Letter discusses the status of DEP's VPH/EPH approach and methodologies.

   Any questions on the VPH/EPH approach should be directed to John Fitzgerald at (617) 932-7702 or jfitzgerald@stte.ma.us.

   No comment necessary.

6. *As stated in the report, "the angled boreholes will be drilled at approximately a 45 degree angle, beginning 15 feet away from the building foundation." These boreholes will be completed to 30 feet below the ground surface, and 15 feet within the building foundation." On Figure 4-1 (soil sampling location) it appears that this will give you a sample at 15 feet under the foundation or in the middle of where the UST used to be located. How will the east (far) side of the*

former UST location be sampled? Will the entire "extent of the contamination" be defined for the RAO? The extent of the RAO should be documented vertically and horizontally.

The east end of the former UST area was sampled during an investigation by Tighe and Bond, Inc. in December 1994, location B-4 on Figure 2-2. This soil sample was collected from the 40 to 42 foot depth interval, was analyzed, and detected BTEX compounds below the method detection limit and TPH concentrations of less than 55 mg/kg. In addition, to further document the extent of contamination for the RAO, Parsons ES installed a soil vapor monitoring point (MPC) on the east end of the former UST location in April 1995. This location has shown low concentrations of field analyzed total volatile hydrocarbons (TVH) (less than 75 ppm). Therefore, Parsons ES excluded the collection and analysis of soil from this area because soil and soil gas samples have been collected from this area previously and the results showed low levels of contamination.

RESPONSE TO AFCEE AND WESTOVER ARB COMMENTS TO DRAFT CLOSURE SAP FOR THE MEDICAL TRAINING FACILITY SITE, WESTOVER ARB, MASSACHUSETTS

These responses have been prepared to address AFCEE and Westover ARB comments made to the Draft Closure SAP for the Medical Training Facility site at Westover ARB, Massachusetts. Each AFCEE and Westover ARB comment is shown below in italics with the corresponding response below each comment.

AFCEE Comments:

1. *Figure 2.3. All the following refer to the field and lab sample:*
   a. Indicate in the legend text that the lab data are gas samples
   b. Are the lab data ppmv or ppm?
   c. Please be consistent in upper/lower case. Field data is ppmv and lab data is PPM.

   a. The following change has been made to the legend on Figure 2.3; "soil gas field screening results" has been added to replace "field screening results" in the legend on Figure 2.3.
   b. A note was added in the legend on Figure 2.3 that laboratory results are in milligrams per kilogram.
   c. All upper case PPMs were changed to lower case.

2. *Page 4-1, Section 4.1, First line in text. Replace "horizontal" with "angled"*

   Done.

3. *Please verify with the Army CoE folks about the proposed procedures to refill the angled borings. I just want to make sure that there is no question about altering the foundation's integrity by improperly refilling the boreholes. They may call for filling with tremie tubes and cement (as an example) or they may say that the holes are so small that there won't be any structural impacts (hopefully). Please get their input in writing.*

   The Medical Training Facility is now the responsibility of Westover ARB Civil Engineering. The Base Civil Engineer and CEV personnel stated in a fax sent to Mr. John Mastracchio (Parsons ES) on February 13, 1997 that they have no objections with the proposed angled drilling under the building. They further clarified in a second fax sent to Mr. Mastracchio on February 26, 1997 that the holes would not have any structural impact to the building and backfilling with cement grout will not be necessary.

Westover ARB Comments:

1. *p.3-1, Sec. 3 Include in this section that a project Licensed Site Professional (LSP) will be employed to advise on and approve of the site cleanup requirements. You may want to include information on the LSP (such as name, license number, etc.) in a later section (appendix). This person will become the*

new LSP of Record on this project.

A paragraph has been added to Section 3-1 stating that the new LSP is Robert Kane, that he will review all pertinent site documents, and approve of the site closure requirements. Information on the LSP is included in Section 9, Points of Contact.

2. *If you have employed an LSP, has this person reviewed this work plan?*

   Yes. Robert Kane has reviewed the Draft Closure SAP and has provided comments in support of the Draft Final Closure SAP.

3. *p. 3-2, Last Paragraph Include a qualifying statement to the effect that the Class RAO will depend upon the results of the sampling.*

   The following sentence has been added to the last paragraph on p. 3-2; "The Class RAO (i.e. Class A-2 or Class A-3) at the MTF will depend on the results of the soil sampling."

4. *p.4.2, Sec. 4.2 Check with the project LSP on whether the EPH/VPH analytical method would be helpful or appropriate to use. (The Massachusetts Department of Environmental Protection appears to be in favor of Potentially Responsible Parties using this method rather than the Total Petroleum Hydrocarbon analysis).*

   Although the Massachusetts DEP does not currently require EPH/VPH analysis, it does appear to be gaining their favor. It is possible that in the future EPH/VPH analysis may be required for closure of petroleum contaminated sites. Therefore, EPH/VPH analysis has been added for five of the soil samples we will be collecting. Three of the samples to be analyzed for EPH/VPH will be collected from the angle borings and two will be collected from the vertical borings. These changes have been incorporated into Section 4.2 Analytical Methods and Table 4.1.

5. *p. 5.1, Sec. 5 The first sentence should read similar to the following: "Following receipt of the laboratory analytical results, a Draft Response Action Completion Report and a Response Action Outcome Statement will be prepared by a Licensed Site Professional and will be submitted to Westover ARB and AFCEE.*

   Revised.

6. *p. 6-3 Waste Inventory, Tracking, and Reporting: Specify who will be funding the costs of any hazardous waste generated as a result of the completion of this project.*

   The following statement has been added to p. 6-3; "Disposal of all waste will be funded and coordinated by Parsons ES, however, it will be the responsibility of Westover ARB to sign the manifest and any other appropriate forms."

To: John Ratz @ Parden
From: EDWARD MARCHAND@ERT
Cc:
Bcc:
Subject: Westover BV comments
Attachment:
Date: 5/12/97 2:03 PM

John, the following are my comments on "FINAL - Closure Sampling and Analysis Plan for MTF":

1) Page 4-1, first sentence of second paragraph. Delete "soil and" from " limited soil and soil gas sampling".

2) Correct references to Captain vs Major for my rank.

Both of these changes can be made during the interim (no revised FINAL) for when the final SAP goes into the closure report as the appendix. Proceed w/sampling when base/regulator approval arrives.

Ed